ABSTRACT OF THE DISCLOSURE

An *in vitro* tissue angiogenesis and vasculogenesis system is disclosed that allows the outgrowth of microvessels from a three-dimensional tissue fragment implanted in a matrix. The matrix may, for example, be a fibrin- or collagen-based matrix fed by a growth medium, for example, a mixture of tissue culture medium, serum, or a layer of growth medium containing a defined mixture of growth factors. This system, which may be used with human or other mammalian or animal tissues, may be used in assaying tumor angiogenic potential, or in promoting angiogenesis in other tissues, e.g., promoting angiogenesis prior to transplantation of a tissue. The angiogenic potential of a tissue can be determined by measuring the growth of microvessels into the matrix. The three-dimensional structure of the tumor or other tissue is maintained in the matrix, including blood vessels. In another aspect, the method allows for the proliferation of a tissue specimen, thus increasing the mass of cells available for subsequent transplant; and the method also provides for the proliferation of blood vessels from the tissue mass, thus enhancing the chance of successful engraftment.